2002 Mammalian Inventory Annual Report for Selected Southern Colorado Plateau Network Parks:

Aztec Ruins National Monument

El Morro National Monument

Petroglyph National Monument

Salinas Pueblo Missions National Monument

Yucca House National Monument

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Introduction

Historically, the Colorado Plateau has been the subject of many geological and biological explorations. J. W. Powell explored and mapped the canyon country of the Colorado River in 1869 (Powell 1961). C. H. Merriam, V. Bailey, M. Cary and other employees of the Bureau of Biological Survey conducted biological explorations of the area in the late 1800's. In recent times, researchers such as S. D. Durrant (1952), D. M. Armstrong (1972), J. S. Findley et al. (1975), D. F. Hoffmeister (1986) and J. Fitzgerald et al. (1994) have made considerable contributions to our understanding of the fauna of the Colorado Plateau. Despite earlier efforts, biological details on many regions of the plateau have remained insufficiently explored.

In an effort to gather valuable biological information, the National Park Service (NPS) initiated a nationwide program to inventory vascular plants and vertebrates on NPS lands. The U.S. Geological Survey, Fort Collins Science Center, Arid Lands Field Station became cooperators on this effort in 2001 when we began two-year mammalian inventories on five parks within the NPS Southern Colorado Plateau Network: Aztec Ruins National Monument (AZRU), El Morro National Monument (ELMO), Petroglyph National Monument (PETR), Salinas Pueblo Missions National Monument (SAPU), and Yucca House National Monument (YUHO). Existing baseline data on mammal occurrences in these parks varied from very little to nearly complete, and in all cases information was insufficient to assess the status of species of local concern.

Because of the region's widely varying topography, the Southwest accommodates the highest native mammalian species richness in the country, with many species endemic to the area (Mac et al. 1998). With such a large number of species, it is only natural that this area be the focus of inventory efforts. Over the last decade less emphasis has been given to the status of large carnivores with small mammals earning more attention. The U.S. Fish and Wildlife Service's list of species of concern (1994) now emphasizes smaller species such as shrews, bats, rabbits, pocket gophers, tree squirrels, and a variety of mice and rats, mainly because of restricted ranges or lack of information. We know little of the status and trends of these species. The SCPN proposal (2000) included estimates of the number of species expected in each park, based on park size. Numbers of species calculated for each park were: AZRU, 26; ELMO, 31; PETR, 38; SAPU, 31; and YUHO, 18.

Objectives

The primary objective of these inventories was to document the occurrence of at least 90% of the mammals expected within each park by means of a two-year field effort and examination of existing records. Secondary objectives included: describing the distribution and abundance of species of special concern, such as Threatened and Endangered species, exotics and other species of special management interest found within each park; providing baseline information necessary for the development of a monitoring strategy; and assisting in the development of a coordinated network data management effort resulting in biological resource information being accessible to resource managers, scientists and the public. Data from this project will directly contribute to the development of a long-term monitoring curriculum for each park.

Study Areas

The Colorado Plateau is a geologically and topographically distinct basin with numerous plateaus and surrounded by highlands. It is situated between the arid Great Basin to the west and the lush forests of the Rocky Mountains to the east, covering approximately 130,000 mi^2 from southeastern Utah and western Colorado, to northern Arizona and northwestern New Mexico (Wheeler 1990). Vegetation ranges from arid lowlands with cacti, saltbush and piñon-juniper woodlands; to open grasslands with scattered sagebrush and riparian woodlands; to high elevation coniferous forests, aspen and wet meadows. The NPS Southern Colorado Plateau Network includes parks in Arizona, southeastern Utah, southwestern Colorado, and New Mexico.

Inventory of plant and animal species is necessary to establish a baseline of abundance and distribution in order to detect future changes due to development within the park. The presence of threatened, endangered, and other sensitive plant and animal species should be documented so that protection can be assured during development (e.g., new buildings, trail work, fences, oil and gas leases).

Aztec Ruins National Monument

Aztec Ruins National Monument is located in the Animas River valley in northwestern New Mexico, north of the city of Aztec, San Juan County. AZRU included more than 128 ha (317 ac) of Upper Sonoran desert scrub. Dominant vegetation included four-wing saltbush (*Atriplex canescens*), rabbitbrush (*Chrysothamnus* sp.), black greasewood (*Sarcobatus vermiculatus*), and sagebrush (*Artemesia* sp.) with piñon and juniper woodlands on the uplands. Willows (*Salix* sp.) and cottonwoods (*Populus* sp.) bordered the riverbanks and ditches, with cattails (*Typha* sp.) growing in the marshy areas. The monument also included some cultivated areas and Ancestral Pueblo ruins. Elevation ranges from 1716-1774 m (5630-5820 ft). We worked throughout the monument. The natural resources of this site, including water, croplands, and riparian vegetation, were important to the prehistoric inhabitants.

The fauna of AZRU had received no systematic inventory work prior to these inventories. A survey for sensitive, threatened, and endangered species (Ecosphere Environmental Services 1996) covered only about 4 acres of the Monument. Although the project report noted that no wildlife was seen, it provided a hypothetical species list for the area, which included 13 mammal species.

El Morro National Monument

El Morro, located in western New Mexico, features a sandstone monolith rising 200 ft above the valley floor. The monument also included pre-Columbian petroglyphs and Pueblo Indian ruins and encompassed 421 ha (1,040 ac) federal and 97 ha (240 ac) of nonfederal lands. Inventories of plant and animal species of the monument will provide information for management decisions on resource issues, including the occurrence of rare and endemic species associated with the historic pool and box canyon.

No systematic mammal survey had been conducted at ELMO prior to this inventory and only limited work on mammals has occurred in this part of New Mexico (Findley et al. 1975). A checklist document, Mammals of El Morro National Monument (1986) exists that lists 73 species of mammals, of which 38 had apparently been recorded within the Monument. The remaining 35 supposedly occur in the vicinity of El Morro.

Petroglyph National Monument

Petroglyph National Monument is located in central New Mexico within the city of Albuquerque, Bernalillo County. The monument was established to protect the array of petroglyphs created by Native Americans and early Europeans in the basalt boulders of the area. It included five volcanic cinder cones, more than 27 km (17 mi) of volcanic basalt escarpment, and encompassed 2,928 ha (7,236 ac) of desert scrub, chaparral, and temperate grassland vegetation types. A sandy wash at the south end of the park also supported willows and junipers. Elevation ranges from 1665-1820 m (5465-5971 ft). Inventory efforts focused on areas not surveyed in previous studies (Parmenter and Lightfoot 1996). Changes in the surrounding lands are likely to affect natural resources within the monument boundaries; these changes include increasing development and an increase in the number of exotic species. Inventory (and subsequent monitoring) will allow managers to detect changes in ecological communities resulting from natural cycles as well as anthropogenic pressures.

A survey of the biological resources of Petroglyph National Monument (Parmenter and Lightfoot 1996) listed 28 mammal species based on field observations and collections at the Museum of Southwestern Biology at the University of New Mexico. Not all of these collections are from the park but are from the general area.

Salinas Pueblo Missions National Monument

SAPU, approximately 64 km (40 mi) southeast of Belen, in Torrance and Socorro counties, New Mexico, encompassed 445 ha (1,100 ac), and consisted of three units, each featuring pre-Spanish ruins and Spanish colonial churches: Abó, Quarai, and Gran Quivira. Vegetation was predominantly piñon and juniper woodland with associated desert shrubland. Abó and Quarai also had areas of riparian vegetation. Elevation ranged from 1859-2011 m (6100-6600 ft).

Salinas Pueblo Missions National Monument had not received any systematic survey of its mammal fauna prior to this inventory, other than work by Scott (1979) at Gran Quivira. The limited information in the site's database is from unverified sources, and the list of mammal species has not received critical review.

Yucca House National Monument

Located in Montezuma County between the towns of Towaoc and Cortez, Montezuma County, Colorado, at the base of Sleeping Ute Mountain, YUHO includes 14 ha (34 ac) of currently designated parkland. Inventory surveys included some private lands around the monument that contain habitat important to the long-term ecological health of the monument. Our efforts during 2002 focused on areas that included big sage (*A. tridentata*), juniper woodland, and a stock pond. An irrigation ditch and 2 stock ponds that held water during 2001 were dry during 2002 as a result of the installation of underground water pipes.

Elevation ranged from1796-1872 m (5892-6142 ft). Inventory and monitoring will be essential for determining the presence and abundance of animal species, and providing baseline information for monitoring effects of potential spring depletions, invasion by exotic species, and restoration of newly-acquired lands.

A mammal species list developed primarily by Marilyn Colyer was updated in January 2000. However, this list was based mostly on observations and a compilation of various other unpublished sources. Systematic inventory work was needed to provide a reliable, relatively complete information.

Methods

Initially, we prepared a list of mammals for each park that included all species within the range using Armstrong (1972), Findley et al. (1975), Fitzgerald et al. (1994), and Durrant (1952). Species on each list were designated as unconfirmed (i.e. unlikely to occur), possibly present (i.e. species likely to occur, range includes or is near the park), or present (i.e. previously documented) for that park. These lists were then updated based on data collected in 2001 and 2002. Using the updated lists, we were able to assess our progress toward documenting 90% of likely species occurring on a given park.

Field efforts in 2001 used random as well as targeted searches and trapping. Field efforts in 2002 focused on the most speciose groups with the greatest promise of increasing the level of documentation, especially carnivores, bats, and rodents. We specifically inventoried for small terrestrial mammals, bats and carnivores. Inventory methods included traplines, mistnetting, acoustic surveys, and track and scat surveys. Other mammal groups (e.g. ungulates) were documented opportunistically.

In most instances, animals were captured alive, identified to species, assessed for age, sex, and reproductive condition, and released unharmed. Animals that were previously undocumented in a park were kept as vouchers. Vouchers of select individuals were also retained for identification verification. All trapping and observation locations were recorded using Global Positioning System (GPS; Garmin 12) units set to UTM, NAD27. Data was recorded onto datasheets and then entered into an electronic spreadsheet.

Capture and handling of animals was performed in accordance with written protocol approved by the USGS Fort Collins Science Center, Animal Care and Use Committee. Voucher specimens (skins and skeletal material) and photographs are housed in the USGS Biological Survey collection at the Museum of Southwestern Biology, University of New Mexico (UNM). Samples of heart, kidneys and liver were preserved in liquid nitrogen and deposited in the Division of Genomic Resources at UNM.

Small terrestrial mammal inventories

We inventoried for rodents and other small mammals using Sherman live traps, Havahart live traps, pitfall arrays or snap traps arranged in traplines (Wilson et al. 1996). Traplines typically consisted of 40-80 traps placed at 10-15 m intervals. Paired transect lines (Calhoun lines) were also used. Traps were baited with dry oatmeal and left open overnight and often during diurnal hours. Un-baited pitfall traps, consisting of 1-gallon plastic buckets, were

buried at ground level in attempts to capture insectivores and other small mammals. Traps were set in both targeted and randomly chosen areas during 2001 field efforts. Study sites were selected so that each major type of habitat within a given park was sampled. During 2002, most traplines were set in areas likely to have a successful yield for targeted species. Effort was reported as number of trap-nights (total number of traps multiplied by number of days).

Bat inventories

Bats were inventoried using mist nets and acoustic surveys. Mist nets were strung across and around bodies of water in order to capture bats coming in to drink or feed on insects flying over the water (Kunz and Kurta 1988). Size of nets ranged from 6-20 m (18-60 ft) and number of nets varied depending on the area of the body of water. Mist nets were set up shortly before sunset and tended for several hours. Number of nets used varied, depending on the size and shape of the body of water. This method is especially effective when sources of water in the landscape are limited, as this causes bats to be concentrated in a relatively small area and are therefore easily captured.

Acoustic surveys entailed using a bat detector and zero-crossing analysis interface module (ZCAIM; Anabat II hardware, Anabat software version 6.3f; Titley Electronics, Ballina, New South Wales, Australia) with a laptop computer to record echolocation calls. A bat detector produces audible output from the ultrasonic calls emitted by echolocating bats. The ZCAIM interfaces the audio-frequency signal from the detector to a computer. Analyses were performed using Analook software (version 4.8n, Titley Electronics, Ballina, New South Wales, Australia). The frequency-time display generated by the software from detected echolocation call sequences were then used to identify species based on qualitative analysis of call parameters compared to reference calls from known individuals (Fenton and Bell 1981; O'Farrell et al. 1999). This method is useful when no water is available over which to net or when water is too ample to effectively concentrate bats over a small enough area for capture. Acoustic surveys are also useful for detecting species that are not easily captured in mist nets.

Effort was recorded as net-nights (number of mist nets multiplied by number of nights) and acoustic hours (total number of hours spent recording echolocation calls).

Carnivore inventories

In order to document carnivores, we conducted track-scat surveys, live-trapping, and spotlighting. Track-scat surveys entailed searching the parks on foot in areas likely to attract animals and show evidence of animals, such as around water sources, in canyon bottoms, in sandy soils, and around areas where humans leave refuse (e.g. campgrounds and housing areas). Tracks, scat, carcasses, and animals were documented with photographs, when possible, and a location. We also attempted to capture small carnivores using Havahart live-traps baited with a variety of malodorous items. We used a handheld spotlight to view animals at night. Effort for carnivore inventories was quantified as survey distance (km) or number of trap-nights. Carnivore inventories were conducted only in 2002.

Opportunistic observations

Anytime a species or sign of a species (e.g. tracks, scat, middens) was observed that had not been documented by trapping or other means, it was noted. Location was recorded for all opportunistic observations, and when possible a voucher photograph was obtained. Opportunistic observations were the predominant means of documenting ungulates, but many other species were also documented in this manner.

Data analyses

Species richness (number of species documented) and relative abundance of species (percent of all individuals detected) were calculated for each park. We also provided a summary of effort for each park including person-days, trap-nights, mist net-nights, acoustic hours and survey distance, as appropriate. Finally, we updated the mammal species list for each park based on captures, observations, and historical records. Scientific names in this report follow Jones et al. (1997) with the exception of Townsend's big-eared bat (*Corynorhinus townsendii*, Tumlison and Douglas 1992) and western chipmunks (*Eutamias* spp., Hoffmeister 1986). For the most part these names are consistent with the Integrated Taxonomic Information System (ITIS) followed by NPS

Results

Fieldwork was conducted from May to October 2002 (Table 1). We accumulated 88 person days, 1,542 trap-nights, 28 net-nights, 48.0 acoustic hours, and covered a distance of 71.8 km on track-scat surveys toward fulfillment of our objective. We captured or observed signs of 398 mammals of 50 species, including 15 species of bats, 22 species of rodents, 2 species of lagomorphs, 10 species of carnivores, and one species of ungulate (Table 2). Thirty-five species occurrences were documented in 2002 that were not documented in 2001.

Ten percent of all animals captured or observed during the 2002 inventory were piñon mice (*Peromyscus truei*; Table 3). Conversely, during the 2001 inventory, deer mice (*P. maniculatus*) were the most frequently encountered species. This may be the result of more targeted trapping effort during 2002, rather than the more random trapping conducted during 2001. Overall capture rate for terrestrial mammal trapping on SCPN parks was 13% in 2002, compared to 7% during 2001. Of bats captured or observed, big brown bats (*Eptesicus fuscus*) were the most common. This was also true for the 2001 inventory.

Following the 2002 field season, level of documentation based on current working lists of mammals for each park (Table 4a-e) was as follows: AZRU, 50%; ELMO, 56%; PETR, 55%; SAPU, 65%; YUHO, 85% (Table 5a-e).

Aztec Ruins National Monument

Efforts at AZRU included three visits and 14 person days, 80 trap-nights, 11 net-nights, 8.1 acoustic hours, and a distance of 6.9 km for track-scat surveys (Table 1). The majority of our efforts focused on documenting bats and carnivores. We also set two lines of rodent traps near the river, an area that was not targeted for rodents during the 2001 inventory, and conducted searches for diurnal mammals. We captured or observed 41 animals of 20 species, including 7 bats, one lagomorph, 6 rodents, 5 carnivores, and one ungulate (Table 2). Capture rate for terrestrial mammals was 1% during 2002, compared with 7% during 2001.

Park personnel also documented two species: red fox (*Vulpes vulpes*) and porcupine (*Erethizon dorsatum*). Fourteen species were documented in 2002 that were not documented during the 2001 inventory including 3 species of bats, 5 rodents, and 6 carnivores.

Coyote was the most frequently encountered species at AZRU during 2002 (17% of individuals documented; Table 3). Other common species included big brown bat (12%) and Brazilian free-tailed bat (*Tadarida brasiliensis*; 10%). Species richness was greatest at the irrigation ditch (waypoint AZ004A) where 7 species were documented using mist nets, acoustic surveys, and opportunistic observations (Table 6a).

Our updated "master" list includes 58 mammal species likely to occur on the park (Table 4a). Following the 2002 inventory, we have documented 50% of bats (up from 44% in 2001), 52% of rodents (30% in 2001), and 43% of carnivores (7% in 2001; Table 5a). There was no change in the number of insectivores, lagomorphs, or artiodactyls documented. We will continue work at AZRU in 2003 to improve levels of documentation.

El Morro National Monument

The 2002 field season was the first year for mammal inventories at ELMO. We made 3 visits to ELMO and accrued 20 person-days, 440 trap-nights, four net-nights, 10.3 acoustic-hours, and a distance of 16.5 km during carnivore surveys (Table 1). One hundred thirty-one animals were captured or observed, consisting of 13 species of bats, one lagomorph, 11 rodents, and five carnivores (Table 2).

The most common species at ELMO were piñon mice and deer mice (*P. maniculatus*), comprising 16% and 13% of individuals encountered, respectively (Table 3). Capture rate for terrestrial mammals was 16% during 2002. The most common bat species encountered was little brown bat (*Myotis lucifugus*; 4% of all captures, 28% of bats).

Species richness for locations sampled for bats was highest at the pool (waypoint EL001A), where 13 species were documented (Table 6b). For locations sampled for terrestrial mammals, species richness was greatest in the piñon-juniper woodland, 0.82 mi NE of the visitor center (REL101A, REL101B) where 5 species were captured.

Following the first year of inventories, 2002, level of documentation for major groups of mammals at ELMO (based on the current working list of 54 mammals likely to occur on the park; Table 4b) was as follows: insectivores, 0%; bats, 72%; lagomorphs, 33%; rodents, 65%; carnivores, 42%; ungulates, 0% (Table 5b). Additional fieldwork will be conducted at ELMO during 2003.

Petroglyph National Monument

Forty-nine mammals of 13 species were documented at PETR (Table 2). Species documented consisted of 3 bats, one lagomorph, 10 rodents, 4 carnivores, and one ungulate. Occurrences unique to the 2002 inventory were big brown bat, Brazilian free-tailed bat, porcupine (*Erethizon dorsatum*), rock pocket mouse (*Chaetodipus intermedius*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), and mule deer (*Odocoileus hemionus*). We

used 20 person-days, 280 trap-nights, 11.7 acoustic-hours, covered a distance of 28.6 km during carnivore surveys, and made four visits to PETR (Table 1).

The most common species on PETR during 2002 was the cactus mouse (*P. eremicus*), which accounted for over 16% of individuals documented (Table 3). Other common species included Ord's kangaroo rat (*Dipodomys ordii*; 10%), white-tailed antelope squirrel (*Ammospermophilus lecurus*; 8%), silky pocket mouse (*Perognathus flavus*; 8%), deer mouse (8%), and white-throated woodrat (*Neotoma albigula*; 8%). Capture rate for terrestrial mammals was 11% during 2002, compared with 6% during 2001.

Species richness was greatest in the grasslands on Rinconada Mesa (waypoints RPE08A, RPE08B; PE001A; RPE01A, RPE01B), where 4 species were captured (Table 6c). Other sampling sites with relatively high species richness were around the Lava Shadows Annex (RPE04A, RPE04B), around the visitor center (RPE03A, RPE03B), and near the south cinder cone (RPE02A, RPE02B), where 3 species were captured on each trapline. Bats were rarely encountered at PETR, presumably because of the lack of standing water on the park. We watched several bats emerging from daytime roosts in lava rock outcrops in Boca Negra canyon, however.

Our updated list includes 60 mammal species likely to occur on the park (Table 4c). We have documented 31% of bats (up from 13% in 2001), 83% of rodents (75% in 2001), 38% of carnivores (23% in 2001), and 50% of artiodactyls (0% in 2001; Table 5c). There was no change in the number of insectivores or lagomorphs. We will continue work at PETR in 2003.

Salinas Pueblo Missions National Monument

During the 2002 field season we made three visits to SAPU during which time we expended 19 person-days, 502 trap-nights, five net-nights, 7.1 acoustic hours, and 13.6 km of carnivore surveys at SAPU (Table 1). We captured and observed 109 mammals, including 4 species of bats, one lagomorph, 10 rodents, 4 carnivores, and one ungulate (Table 2). Six species were new to the 2002 inventory: Brazilian free-tailed bat, silver-haired bat (*Lasionycteris noctivagans*), western pipistrelle (*Pipistrellus hesperus*), long-tailed weasel (*Mustela frenata*), mountain lion (*Puma concolor*), and red fox.

The most frequently encountered species during 2002 was piñon mouse (17% of individuals documented); followed by brush mouse (*P. boylii*; 14%), white-footed mouse (*P. leucopus*; 12%) and hoary bat (*Lasiurus cinereus*; 12%; Table 3). Capture rate for terrestrial mammals was 15% during 2002, compared with 6% in 2001.

Species richness for locations sampled for bats was greatest at the pond at Quarai (waypoint SA005A) where 9 species were documented using mist nets and acoustic surveys (Table 6d). Species richness for locations sampled for terrestrial mammals was greatest at a heavily vegetated arroyo (RABO1A, RABO1B), an arroyo and nearby woodland (RABO3A, RABO3B), and a denuded plain (RABO6A, RABO6B) at Abó, where 5 species were captured on each trapline.

The updated list lists 60 mammal species likely to occur on the park (Table 4d); we have documented 65% of bats (up from 41% in 2001) and 36% of carnivores (14% in 2001; Table 5d). There was no change in the number of insectivores, lagomorphs, rodents or artiodactyls documented. We will conduct additional work at SAPU in 2003.

Yucca House National Monument

Efforts at YUHO resulted in the capture or observation of 22 mammals consisting of 3 species of bats, 2 lagomorphs, one rodent, 4 carnivores, and one ungulate (Table 2). We accumulated 7 person-days, 6 net-nights, 9.3 acoustic-hours, and a carnivore survey distance of 6.2 km during 3 visits (Table 1). Four species of bats not documented previously were recorded during 2002 using acoustic surveys: little brown bat, Yuma myotis (*M. yumanensis*), Townsend's big-eared bat (*Corynorhinus townsendii*), and Brazilian free-tailed bat.

Deer mice were the most frequently encountered species at YUHO during 2002 and comprised over 19% of individuals captured (Table 3). Coyote were also relatively common, accounting for over 15% of individuals observed. Capture rate for terrestrial mammals was 6% during 2002, compared with 11% during 2001. The most common bats on YUHO were big brown bats and long-legged myotis (*M. volans*), which each accounted for 8% of individuals.

Species richness for locations sampled for bats was greatest at the south stock pond, west of the Ismay house (waypoint YU001A) where 11 species were documented using mist nets and acoustic surveys (Table 6e). Species richness for locations sampled for terrestrial mammals was greatest around the ruins (YU15C) and near the road junction and irrigation ditch (RYU10A, RYU10B), where 2 species were captured on each trapline.

Our updated list includes 54 mammal species likely to occur on the park (Table 4e). We believe we have documented 100% of bats (up from 80% in 2001; Table 5e). There was no change in the number of insectivores, lagomorphs, rodents, carnivores or artiodactyls documented. Additional work is planned at YUHO and on the Ismay property in 2003.

Discussion

Our current efforts to document mammalian species on parklands are very much a work in progress. This is because several factors affect these efforts. One especially problematic area is exactly what list of species should be used as the measuring stick against which documentation is assessed. We have chosen to use a list of species that we deem "likely" to occur, based on our work, our knowledge of mammals of the Colorado Plateau, and pertinent references. For the most part, these "likely" species are those listed as "Present" or "Probably Present" on the Master Species Lists. Given the relatively small size of the five parks, it seems likely that our lists are currently too inclusive.

Our estimates for inventory completeness after two years of effort differ considerably from those used by the SCPN as "starting points" for this inventory effort (NPS SCPN Proposal 2000). These figures (NPS estimate, followed by our current estimate) for the five parks are:

AZRU, 0%, 50%; ELMO, 85%, 56%; PETR, 70%, 55%; SAPU, 30%, 65%; and YUHO, 75%, 85%. We believe that inventory completeness was overestimated for most parks, probably because smaller, less-inclusive lists were used (small, poorly-known and secretive mammals such as bats and small rodents may have been overlooked). In any case, we believe that additional work in 2003 will help resolve many of these differences by allowing additional species to be documented or, conversely, removed from the working list.

Park size undoubtedly influences species diversity and a variety of mathematical algorithms incorporate size in attempting to predict the numbers of species (but not actual species) that may occur on a park. These algorithms did not, in our opinion, provide meaningful estimates of mammalian diversity on the parks where we worked (estimate first, number currently documented second): AZRU, 26, 27; ELMO 31; 30; PETR, 38, 33; SAPU, 31, 39; YUHO, 18, 46 (including Ismay property). Although we think we are competent in conducting inventories for mammals, we don't think we have accomplished 100+% documentation. In fact, just our tabulation of number of species likely to occur is about double those predicted in the SCPN proposal. Although our estimates will probably prove to be slightly too high, it seems clear that the original predictions were much too low.

The general prediction from species-area relationships is that, other things being equal, larger areas will be more species-rich. Interestingly enough, when we compared number of species documented (by all means) against park size in 2001 the relationship was weakly inverse (R^2 = 0.35), with smaller parks appearing to exhibit greater species diversity. We have not re-examined this relationship in 2002 but will do so in the Final Report due in 2003. Given that all these parks are small (< 3000ha) comparisons are relatively limited. Additionally, there are several confounding factors that may contribute to unexpected disparities in size of park and numbers of mammal species. First of all, the supposedly smallest park is YUHO, but we worked on adjacent parts of the Ismay property that total about 470ha. PETR is a relatively homogeneous park from a small mammal standpoint without some of the habitat diversity that characterizes the other parks and there is no open water over which bats can be netted. Thus, it is possible that at PETR, some species will be difficult to document and the fauna may be somewhat impoverished as well.

At present, our success at documenting species occurrence on SCPN parks is lowest for AZRU (50%; 130ha). This may be a result of using a species list that is too inclusive. Our success at documenting mammals on parks is facilitated by the existence of a good recent treatment of mammals for the state or region. Recent references allow us to construct a more meaningful list of likely species. For the SCPN parks where we worked, the most detailed references are somewhat dated (Armstrong 1972, Findley et al. 1975). Until we can gather more data on occurrence or absence, especially from interviews with park staff and local wildlife officials, we are disinclined to modify the current lists as we think they represent good lists from which to work.

One factor in assessing species occurrence is the biology of the animals that we are trying to document. It is axiomatic in biology that only a few species are truly common and most others are much less common to rare. The occurrence of common, widespread, and abundant species, such as *P. maniculatus*, is easy to document and our results offer visible proof of

this. However, less common and rare species can be very difficult to document and absolute absence is hard to prove. Another biological phenomenon that can affect the results of our inventory attempts is whether or not the populations of certain species fluctuate over time. Our capture rate for terrestrial mammals on SCPN parks during 2001 was 6.2%. It was our impression, reinforced by considerable experience in trapping on the Colorado Plateau, that population numbers of small mammals were low in 2001. This may correlate with recent climatic factors (e.g., low precipitation) on the plateau and emphasizes the importance of multi-year inventories of small mammals. Climate, especially precipitation, also interacts with species biology in influencing population levels of rodents.

Aspects of climate and especially availability of water affect our ability to inventory some small mammals (especially bats) and interact with features of biology of each species. Bats are dependent on the availability of roosting sites, water sources, and adequate prey. The extent of available water in a given area, as well as subtleties of pond shape and size, can affect capture success of bats (Kunz and Kurta 1988, K. Geluso personal communication). Typically, captures of bats in mist nets are lower when water is abundant, as the bats seem to be more dispersed over the landscape. When water sources are fewer, bats tend to concentrate at those waterholes that are available (and mammalogists exploit this tendency when possible). In general, our level of effort for rodent trapping exceeded the mist-netting effort. This is because, relatively speaking, mist-net sites are limited in occurrence and outnumbered by available trapping locations. Nonetheless, it is not uncommon for the number of bats captured in a given night to exceed the number of rodents captured. This phenomenon likely reflects the limited extent of available water in the area as well as the occurrence of good roosting habitat in nearby cliffs.

Other more proximate factors that may interfere in inventory efforts include inclement weather, which can depress activity of small mammals (and mammalogists) and the efficiency of methods used to inventory them. Rainfall can dissolve bait, cause traps to trigger, and turn mist nets into soggy, non-functional curtains. Likewise, subtle seasonal changes in species natural history or the physical environment may influence our activities.

Some species documented are considered rare, uncommon, or poorly known and some are recognized by states as "species of concern." Some also are former category 2 candidate species (USFWS, 1994). We captured several bat species of concern including the western small-footed myotis at AZRU, Townsend's big-eared bat, fringed myotis, long-legged myotis and Yuma myotis (*M. yumanensis*) at SAPU, and western small-footed myotis, long-eared myotis (*M. evotis*), fringed myotis, long-legged myotis, and spotted bat at YUHO. Also of note was the capture of eight hispid cotton rats, at the Abó and Quarai units of SAPU. This is a new record for Torrance County, New Mexico.

In 2003, our plans are to focus very selectively on species and groups that are still undocumented. This will allow us to add some species and delete others with more confidence. Finally, we will continue our data mining efforts using published and unpublished literature and voucher specimens in museums.

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Table 1. Field schedule for 2002 Southern Colorado Plateau Network mammal inventories, in chronological order, indicating dates, parks visited, observers, effort and sampling methods.

			Effort					
Date(s)	Park visited	Observer(s)	Person days	Trap nights	Net nights	Acoustic hours	Carnivore survey distance (km)	Sampling method(s)
20-22 May	AZRU	L. Harding, S. Haymond, E. Valdez	7	80	8	5.0	6.9	mist nets, small mammal traplines, acoustic surveys, track-scat survey, small carnivore traplines
22-25 May	PETR	L. Harding, S. Haymond, E. Valdez	10	160		5.0	23.2	small mammal traplines, acoustic surveys, track-scat survey
25-28 May	SAPU	P. Cryan, L. Harding, S. Haymond, E. Valdez	11	9	5	7.1	13.6	mist nets, acoustic surveys, track-scat survey, small carnivore traplines
29 May	PETR	L. Harding, S. Haymond, E. Valdez, C. Viana	4	40		2.1	5.4	acoustic surveys, small mammal traplines, spotlighting
3-9 June	YUHO	S. Haymond, E. Valdez	6		6	9.3		mist nets, acoustic surveys
	PETR	M. Bogan	4					area searches
10-14 June	PETR	S. Haymond, E. Valdez	6	80		4.6		small mammal traplines, acoustic surveys

Table 1. Continued.

Date(s)	Park visited	Observer(s)	Effort					Sampling method(s)
			Person days	Trap nights	Net nights	Acoustic hours	Carnivore survey distance (km)	
	ELMO	M. Bogan, C. Ramotnik	8	320				small mammal traplines
18-21 June	SAPU	M. Bogan, C. Ramotnik	8	493				small mammal traplines; snap traps
2-3 July	YUHO	L. Harding	1				6.2	track-scat survey
15-18 July	ELMO	S. Haymond, E. Valdez, L. Harding	8		4	10.3	16.5	mist nets, acoustic surveys, track-scat survey, spotlighting
19 July	AZRU	E. Valdez	1		3	3.1		mist nets, acoustic surveys
22 August	SAPU	P. Cryan, E. Valdez	2		2	1.5		mist nets, acoustic surveys
19-21 Sept	YUHO	M. Bogan, C. Ramotnik	6	240				small mammal traplines
4-6 Oct	AZRU	M. Bogan	3					opportunistic
16-17 Oct	ELMO	M. Bogan, C. Ramotnik	4	120				small mammal traplines
Total			88	1542	28	48.0	71.8	

Table 2. Species captured and observed during 2002.

	Park code					
Species common name	AZRU	ELMO	PETR	SAPU	YUHO	Total
California myotis		1			1	2
Western small-footed myotis	3	3	3	2	3	14
Long-eared myotis		2			3	5
Little brown bat	1	5			1	7
Fringed myotis		4		2	1	7
Long-legged myotis		2		2	4	8
Yuma myotis	1	1		1	1	4
Myotis sp.				1		1
Silver-haired bat				6		6
Western pipistrelle				1		1
Big brown bat	5	11	3	1	4	24
Hoary bat		1		15		16
Spotted bat	1	1				2
Townsend's big-eared bat		1		1	1	3
Pallid bat	3	5		1		9
Brazilian free-tailed bat	4	4	2	3	2	15
Desert cottontail	2	1		1	1	5
Black-tailed jackrabbit			1		1	2
Cliff chipmunk		2				2
White-tailed antelope squirrel			4			4
Rock squirrel	2		2	1	1	6
Gunnison's prairie dog	1					1
Botta's pocket gopher	1					1
Plains pocket mouse		6		1		7
Silky pocket mouse			4	4		8
Rock pocket mouse			2			2
Ord's kangaroo rat			5			5
Beaver	1					1
Western harvest mouse	1			4	5	10
Brush mouse		12		17		29
Cactus mouse			8			8
White-footed mouse				15		15
Deer mouse		17	4		10	31
Piñon mouse		21		21		42
Northern grasshopper mouse		2	1	1		4

Table 2. Continued.

Species common name	Park code					Total
	AZRU	ELMO	PETR	SAPU	YUHO	
Hispid cotton rat				3		3
White-throated woodrat		3	4	8		15
Mexican woodrat		11				11
Neotoma sp.	1	1				2
Mexica vole		2				2
Porcupine		2	2	1		5
Coyote	7	4	3	5	8	27
Red fox				1		1
Gray fox		2				2
Black bear		2				2
Raccoon	1				1	2
Long-tailed weasel		1		1		2
Badger	1	1				2
Striped skunk	3				1	4
Mountain lion				3		3
Bobcat	1				2	3
Mule deer	1		1	2	1	5
Total	41	131	49	125	52	398

Table 3. Percent relative abundance for mammals captured during 2002.

	Park code					
Species common name	AZRU	ELMO	PETR	SAPU	YUHO	Total
California myotis		0.8			1.9	0.5
Western small-footed myotis	7.3	2.3	6.1	1.6	5.8	3.5
Long-eared myotis		1.5			5.8	1.3
Little brown bat	2.4	3.8			1.9	1.8
Fringed myotis		3.1		1.6	1.9	1.8
Long-legged myotis		1.5		1.6	7.7	2.0
Yuma myotis	2.4	0.8		0.8	1.9	1.0
Myotis sp.				0.8		0.3
Silver-haired bat				4.8		1.5
Western pipistrelle				0.8		0.3
Big brown bat	12.2	8.4	6.1	0.8	7.7	6.0
Hoary bat		0.8		12.0		4.0
Spotted bat	2.4	0.8				0.5
Townsend's big-eared bat		0.8		0.8	1.9	0.8
Pallid bat	7.3	3.8		0.8		2.3
Brazilian free-tailed bat	9.8	3.1	4.1	2.4	3.8	3.8
Desert cottontail	4.9	0.8		0.8	1.9	1.3
Black-tailed jackrabbit			2.0		1.9	0.5
Cliff chipmunk		1.5				0.5
White-tailed antelope squirrel			8.2			1.0
Rock squirrel	4.9		4.1	0.8	1.9	1.5
Gunnison's prairie dog	2.4					0.3
Botta's pocket gopher	2.4					0.3
Plains pocket mouse		4.6		0.8		1.8
Silky pocket mouse			8.2	3.2		2.0
Rock pocket mouse			4.1			0.5
Ord's kangaroo rat			10.2			1.3
Beaver	2.4					0.3
Western harvest mouse	2.4			3.2	9.6	2.5
Brush mouse		9.2		13.6		7.3
Cactus mouse			16.3			2.0
White-footed mouse				12.0		3.8
Deer mouse		13.0	8.2		19.2	7.8
Piñon mouse		16.0		16.8		10.6
Northern grasshopper mouse		1.5	2.0	0.8		1.0

Table 3. Continued.

Species common name	Park code					Total
	AZRU	ELMO	PETR	SAPU	YUHO	
Hispid cotton rat				2.4		0.8
White-throated woodrat		2.3	8.2	6.4		3.8
Mexican woodrat		8.4				2.8
Neotoma sp.	2.4	0.8				0.5
Mexican vole		1.5				0.5
Porcupine		1.5	4.1	0.8		1.3
Coyote	17.1	3.1	6.1	4.0	15.4	6.8
Red fox				0.8		0.3
Gray fox		1.5				0.5
Black bear		1.5				0.5
Raccoon	2.4				1.9	0.5
Long-tailed weasel		0.8		0.8		0.5
Badger	2.4	0.8				0.5
Striped skunk	7.3				1.9	1.0
Mountain lion				2.4		0.8
Bobcat	2.4				3.8	0.8
Mule deer	2.4		2.0	1.6	1.9	1.3

Table 4a. Current working list of mammals from Aztec Ruins National Monument. Species with status in bold are additions based on 2002 efforts.

Common Name	Park Status	Reference/Observation
Merriam's shrew	Unconfirmed	
dwarf shrew	Unconfirmed	
desert shrew	Probably Present	Armstrong, 1972
California myotis	Probably Present	
Western small-footed bat	Present	USGS capture, 2001
long-eared myotis	Probably Present	
little brown bat	**Present**	USGS acoustic file, 2002
Fringed myotis	Probably Present	
long-legged myotis	Probably Present	
Yuma myotis	Present	USGS capture, 2001
silver-haired bat	Probably Present	
western pipistrelle	Probably Present	
big brown bat	Present	USGS capture, 2001
hoary bat	Probably Present	
spotted bat	Present	Rodeck, 1961; Findley et al., 1975
Allen's big-eared bat	Probably Present	
Western big-eared bat	Probably Present	
pallid bat	Present	USGS capture, 2001
Brazilian free-tailed bat	Present	USGS acoustic file, 2001
big free-tailed bat	Present	USGS vocalization, 2001
desert cottontail	Present	USGS observation, 2001; Findley et al., 1975
Nuttall's cottontail	Unconfirmed	
black-tailed jack rabbit	Present	Findley et al., 1975
Hopi chipmunk	Unconfirmed	
white-tailed antelope squirrel	Probably Present	
spotted ground squirrel	Probably Present	
rock squirrel	**Present**	USGS observation, 2002
Gunnison's prairie dog	**Present**	USGS observation, 2002
Botta's pocket gopher	**Present**	USGS observation, 2002
plains pocket mouse	Probably Present	
silky pocket mouse	Present	USGS capture, 2001; Findley et al., 1975
Ord's kangaroo rat	Probably Present	
Banner-tailed kangaroo rat	Probably Present	
beaver	**Present**	USGS observation, 2002
western harvest mouse	Present	USGS capture, 2001; Findley et al., 1975
brush mouse	Present	USGS capture, 2001; Findley et al., 1975

Table 4a. Continued.

Common Name	Park Status	Reference/Observation
canyon mouse	Probably Present	
deer mouse	Present	USGS capture, 2001; Findley et al., 1975
piñon mouse	Present	USGS capture, 2001; Findley et al., 1975
northern grasshopper mouse	Present	USGS capture, 2001
white-throated woodrat	Probably Present	
bushy-tailed woodrat	Probably Present	
Mexican woodrat	Probably Present	
Stephens' woodrat	Probably Present	
montane vole	Unconfirmed	
meadow vole	Probably Present	
muskrat	Probably Present	
house mouse	Present	USGS capture, 2001; Findley et al., 1975
porcupine	**Present**	NPS observation, 2002
coyote	**Present**	USGS observation, 2002
gray wolf	Unconfirmed	
kit fox	Probably Present	
red fox	**Present**	NPS observation, 2002
gray fox	Probably Present	
American black bear	Probably Present	
grizzly bear	Unconfirmed	
ringtail	Probably Present	
raccoon	**Present**	USGS observation, 2002
long-tailed weasel	Probably Present	
black-footed ferret	Unconfirmed	
mink	Probably Present	
badger	**Present**	USGS observation, 2002
western spotted skunk	Present	USGS observation, 2001
striped skunk	**Present**	USGS observation, 2002
mountain lion	Probably Present	
bobcat	**Present**	USGS observation, 2002
wapiti	Unconfirmed	
mule deer	Present	UGSS observation, 2001
pronghorn	Probably Present	

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 4b. Current working list of mammals from El Morro National Monument. Species with status in bold are additions based on 2002 efforts.

Common Name	Park Status	Reference/Observation
Merriam's shrew	Unconfirmed	
dwarf shrew	Unconfirmed	
desert shrew	Probably Present	
southwestern myotis	Probably Present	
California myotis	**Present**	USGS acoustic file, 2002
Western small-footed bat	**Present**	USGS acoustic file, 2002
long-eared myotis	**Present**	USGS voucher, 2002
little brown bat	**Present**	USGS voucher, 2002
Fringed myotis	**Present**	USGS voucher, 2002
long-legged myotis	**Present**	USGS voucher, 2002
Yuma myotis	**Present**	USGS acoustic file, 2002
silver-haired bat	Probably Present	Findley et al., 1975; Zuni Mts.
Western pipistrelle	Probably Present	
big brown bat	**Present**	USGS voucher, 2002
Western red bat	Unconfirmed	
hoary bat	**Present**	USGS acoustic file, 2002
Spotted bat	**Present**	USGS vocalization, 2002
Allen's big-eared bat	Probably Present	
Western big-eared bat	**Present**	USGS acoustic file, 2002
pallid bat	**Present**	USGS voucher, 2002
Brazilian free-tailed bat	**Present**	USGS acoustic file, 2002
big free-tailed bat	Probably Present	
desert cottontail	**Present**	USGS observation, 2002
Eastern cottontail	Probably Present	Findley et al., 1975
black-tailed jack rabbit	Probably Present	
cliff chipmunk	**Present**	USGS voucher, 2002
Colorado chipmunk	Probably Present	Findley et al., 1975; Zuni Mts.
Spotted ground squirrel	Unconfirmed	
Thirteen-lined ground squirrel	Unconfirmed	
rock squirrel	Probably Present	Findley et al., 1975; Zuni Mts.
Gunnison's prairie dog	Probably Present	Findley et al., 1975; Zuni Mts.
Abert's squirrel	Unconfirmed	Findley et al., 1975; Zuni Mts.
red squirrel	Unconfirmed	Findley et al., 1975; Zuni Mts.
Botta's pocket gopher	Probably Present	Findley et al., 1975; Zuni Mts.
Plains pocket mouse	**Present**	USGS voucher, 2002
silky pocket mouse	Probably Present	Findley et al., 1975
hispid pocket mouse	Unconfirmed	
Ord's kangaroo rat	Probably Present	Findley et al., 1975; nr. El Morro
Banner-tailed kangaroo rat	Unconfirmed	

Table 4b. Continued.

Common Name	Park Status	Reference/Observation
beaver	Unconfirmed	
Western harvest mouse	Probably Present	
brush mouse	**Present**	USGS voucher, 2002
white-footed mouse	Unconfirmed	
deer mouse	**Present**	USGS voucher, 2002
piñon mouse	**Present**	USGS voucher, 2002
rock mouse	Unconfirmed	
Northern grasshopper mouse	**Present**	USGS voucher, 2002
white-throated woodrat	**Present**	USGS voucher, 2002
Mexican woodrat	**Present**	USGS voucher, 2002
southern plains woodrat	Unconfirmed	
Stephens' woodrat	Probably Present	
Mexican vole	**Present**	USGS voucher, 2002
Meadow vole	Unconfirmed	
Muskrat	Unconfirmed	
house mouse	Unconfirmed	
porcupine	**Present**	USGS observation, 2002
coyote	**Present**	USGS observation, 2002
gray wolf	Unconfirmed	
kit fox	Probably Present	
red fox	Unconfirmed	
gray fox	**Present**	USGS observation, 2002
American black bear	**Present**	USGS observation, 2002
grizzly bear	Unconfirmed	
ringtail	Probably Present	
raccoon	Probably Present	
long-tailed weasel	**Present**	USGS observation, 2002
black-footed ferret	Unconfirmed	Findley et al., 1975; "Agua Fria"
badger	**Present**	USGS observation, 2002
Western spotted skunk	Probably Present	
striped skunk	Probably Present	Findley et al., 1975; Zuni Mts.
mountain lion	Probably Present	
bobcat	Probably Present	Findley et al., 1975; Zuni Mts.
wapiti	Probably Present	
mule deer	Probably Present	
pronghorn	Probably Present	
Bighorn sheep	Unconfirmed	

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 4c. Current working list of mammals from Petroglyph National Monument. Species with status in bold are additions based on 2002 efforts.

Common Name	Park Status	Reference/Observation
Merriam's shrew	Unconfirmed	
dwarf shrew	Unconfirmed	
desert shrew	Probably Present	
southwestern myotis	Unconfirmed	
California myotis	Probably Present	
western small-footed bat	**Present**	USGS acoustic file, 2002
long-eared myotis	Probably Present	
little brown bat	Probably Present	?= M. velifer of Parmenter and Lightfoot?
fringed myotis	Probably Present	
long-legged myotis	Probably Present	
Yuma myotis	Probably Present	
silver-haired bat	Present	MSB specimen
western pipistrelle	Probably Present	
big brown bat	**Present**	USGS acoustic file, 2002
eastern red bat	Unconfirmed	
hoary bat	Probably Present	
spotted bat	Probably Present	
Allen's big-eared bat	Unconfirmed	
Western big-eared bat	Probably Present	
pallid bat	Probably Present	
Brazilian free-tailed bat	**Present**	USGS acoustic file, 2002
big free-tailed bat	Present	USGS vocalization, 2001
desert cottontail	Present	USGS observation, 2001; MSB specimen
eastern cottontail	Probably Present	
black-tailed jack rabbit	Present	USGS observation, 2001
cliff chipmunk	Unconfirmed	
white-tailed antelope squirrel	**Present**	USGS voucher, 2002
spotted ground squirrel	Present	MSB specimen
thirteen-lined ground squirrel	Unconfirmed	
rock squirrel	Present	MSB specimen; USGS observation, 2002
Gunnison's prairie dog	Unconfirmed	
black-tailed prairie dog	Unconfirmed	
Botta's pocket gopher	Present	MSB specimen
Yellow-faced pocket gopher	Unconfirmed	
rock pocket mouse	**Present**	MSB specimen; USGS voucher, 2002
plains pocket mouse	Present	MSB specimen
silky pocket mouse	Present	USGS voucher, 2001
hispid pocket mouse	Unconfirmed	
Merriams kangaroo rat	Probably Present	

Table 4c. Continued.

Common Name	Park Status	Reference/Observation
Ord's kangaroo rat	Present	USGS capture, 2001
Banner-tailed kangaroo rat	Present	MSB specimen
western harvest mouse	Present	MSB specimen
plains harvest mouse	Present	MSB specimen
brush mouse	Probably Present	
cactus mouse	Present	USGS capture, 2001
white-footed mouse	Present	MSB specimen
deer mouse	Present	USGS capture, 2001
piñon mouse	Present	MSB specimen
rock mouse	Probably Present	Parmenter and Lightfoot, 1996
northern grasshopper mouse	Present	USGS capture, 2001
southern grasshopper mouse	Probably Present	
white-throated woodrat	Present	USGS capture, 2001
southern plains woodrat	Present	MSB specimen
house mouse	Present	MSB specimen
porcupine	**Present**	USGS observation, 2002
coyote	Present	USGS observation, 2001
gray wolf	Unconfirmed	possibly occurred historically
kit fox	Probably Present	
red fox	Probably Present	
gray fox	**Present**	NPS observation
American black bear	Unconfirmed	
grizzly bear	Unconfirmed	possibly occurred historically
ringtail	Unconfirmed	
raccoon	Probably Present	
long-tailed weasel	Probably Present	
black-footed ferret	Unconfirmed	
badger	Present	Parmenter and Lightfoot, 1996
western spotted skunk	Probably Present	
striped skunk	Present	Parmenter and Lightfoot, 1996
mountain lion	Unconfirmed	
bobcat	**Present**	NPS observation, 2002
wapiti	Unconfirmed	
mule deer	**Present**	USGS observation, 2002
pronghorn	Probably Present	NPS observation

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 4d. Current working list of mammals from Salinas Pueblo Missions National Monument. Species with status in bold are additions based on 2002 efforts.

Common Name	Park Status	Reference/Observation
Merriam's shrew	Unconfirmed	
montane shrew	Unconfirmed	
dwarf shrew	Unconfirmed	
desert shrew	Probably Present	
southwestern myotis	Unconfirmed	
California myotis	Probably Present	
western small-footed bat	**Present**	USGS acoustic file, 2002
long-eared myotis	Probably Present	
little brown bat	Probably Present	
fringed myotis	Present	USGS voucher, 2001
long-legged myotis	Present	USGS voucher, 2001
Yuma myotis	Present	USGS voucher, 2001
silver-haired bat	**Present**	USGS voucher, 2002
western pipistrelle	**Present**	USGS acoustic file, 2002
big brown bat	Present	USGS voucher, 2001
eastern red bat	Probably Present	
hoary bat	Present	USGS voucher, 2001
spotted bat	Probably Present	
Western big-eared bat	Present	USGS voucher, 2001
pallid bat	Present	USGS voucher, 2001
Brazilian free-tailed bat	**Present**	USGS acoustic file, 2002
big free-tailed bat	Probably Present	
desert cottontail	Present	USGS observation, 2001
eastern cottontail	Probably Present	
black-tailed jack rabbit	Present	USGS observation, 2001
Colorado chipmunk	Present	USGS capture, 2001
Texas antelope squirrel	Probably Present	
spotted ground squirrel	Unconfirmed	
thirteen-lined ground squirrel	Unconfirmed	
rock squirrel	Present	USGS observation, 2001
Gunnison's prairie dog	Unconfirmed	
black-tailed prairie dog	Unconfirmed	
Abert's squirrel	Unconfirmed	
red squirrel	Unconfirmed	
Botta's pocket gopher	Probably Present	
plains pocket gopher	Present	Findley et al., 1975; MSB specimen

Table 4d. Continued.

Common Name	Park Status	Reference/Observation
yellow-faced pocket gopher	Unconfirmed	
plains pocket mouse	Present	USGS capture, 2001
silky pocket mouse	Present	USGS capture, 2001
hispid pocket mouse	Unconfirmed	
Ord's kangaroo rat	Present	USGS voucher, 2001; Findley et al., 1975
banner-tailed kangaroo rat	Present	Findley et al., 1975
western harvest mouse	Present	USGS voucher, 2001
plains harvest mouse	Unconfirmed	
brush mouse	Present	USGS capture, 2001; Findley et al., 1975
white-footed mouse	Present	USGS capture, 2001; Findley et al., 1976
deer mouse	Present	USGS capture, 2001; Findley et al., 1977
piñon mouse	Present	USGS capture, 2001; Findley et al., 1978
rock mouse	Unconfirmed	
northern grasshopper mouse	Present	USGS capture, 2001; Findley et al., 1975
hispid cotton rat	Present	USGS voucher, 2001
white-throated woodrat	Present	USGS capture, 2001; Findley et al., 1975
Mexican woodrat	Present	Findley et al., 1975
southern plains woodrat	Present	?+G65MSB?
long-tailed vole	Present	USGS capture, 2001; pending identification
Mexican vole	Probably Present	
muskrat	Unconfirmed	
house mouse	Present	USGS capture, 2001
porcupine	Present	USGS observation, 2001
coyote	Present	USGS observation, 2001; Findley et al., 1975
gray wolf	Present Historically	Bailey, 1932
kit fox	Probably Present	see Findley et al., 1975 for nearby locality
red fox	**Present**	USGS observation, 2002
gray fox	**Present**	USGS observation, 2002
American black bear	Probably Present	
grizzly bear	Unconfirmed	Likely occurred historically
ringtail	Probably Present	
raccoon	Probably Present	
ermine	Unconfirmed	
long-tailed weasel	**Present**	USGS observation, 2002
black-footed ferret	Unconfirmed	may have occurred historically
badger	Present	Findley et al., 1975
western spotted skunk	Probably Present	
striped skunk	Probably Present	
mountain lion	**Present**	USGS observation, 2002

Table 4d. Continued.

Common Name	Park Status	Reference/Observation
bobcat	Probably Present	
wapiti	Unconfirmed	
mule deer	Present	USGS observation, scat, 2001
pronghorn	Probably Present	
bison	Unconfirmed	may have occurred historically
bighorn sheep	Unconfirmed	existing are transplants from northern NM

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 4e. Current working list of mammals from Yucca House National Monument and Ismay property. Species with status in bold are additions based on 2002 efforts.

Common Name	Park Status	Reference or Observation
Merriam's shrew	Unconfirmed	
dwarf shrew	Unconfirmed	
Preble's shrew	Unconfirmed	
desert shrew	Probably Present	
California myotis	Present	USGS voucher, 2001
western small-footed bat	Present	USGS voucher, 2001
long-eared myotis	Present	USGS voucher, 2001
little brown bat	**Present**	USGS acoustic file, 2002
fringed myotis	Present	USGS voucher, 2001
long-legged myotis	Present	USGS voucher, 2001
Yuma myotis	**Present**	USGS acoustic file, 2002
silver-haired bat	Probably Present	
hoary bat	Present	USGS capture, 2001
western pipistrelle	Present	USGS acoustic file, 2001
big brown bat	Present	USGS voucher, 2001
spotted bat	Present	USGS vocalization, 2001
Townsend's big-eared bat	**Present**	USGS acoustic file, 2002
Allen's big-eared bat	Unconfirmed	
pallid bat	Present	Armstrong, 1972; Moqui
Brazilian free-tailed bat	Present	USGS acoustic file, 2001
big free-tailed bat	Present	USGS acoustic file, 2001
desert cottontail	Present	USGS observation, 2001
Nuttall's cottontail	Present	M. Colyer, MEVE, 2001
black-tailed jack rabbit	Present	Armstrong, 1972; Moqui
Hopi chipmunk	Probably Present	Armstrong, 1972; Moqui
least chipmunk	Probably Present	see Armstrong, 1972
white-tailed antelope squirrel	Present	Armstrong, 1972; Moqui
rock squirrel	Present	USGS observation, 2001
Gunnison's prairie dog	Present	USGS observation, 2001
Botta's pocket gopher	Present	Armstrong, 1972; Moqui
plains pocket mouse	Probably Present	= apache
silky pocket mouse	Present	Armstrong, 1972; Moqui
Ord's kangaroo rat	Present	Armstrong, 1972; Moqui
beaver	Present	M. Colyer, MEVE, 2002
western harvest mouse	Present	USGS capture, 2001
brush mouse	Present	USGS voucher, 2001

Table 4e. Continued.

Common Name	Park Status	Reference or Observation
canyon mouse	Probably Present	Armstrong, 1972; Moqui
deer mouse	Present	USGS voucher, 2001
piñon mouse	Present	USGS voucher, 2001
northern grasshopper mouse	Probably Present	
white-throated woodrat	Present	USGS voucher, 2001
bushy-tailed woodrat	Probably Present	Armstrong, 1972; Moqui
Mexican woodrat	Probably Present	Armstrong, 1972; Moqui
long-tailed vole	Unconfirmed	
Mexican vole	Unconfirmed	
muskrat	Present	M. Colyer, MEVE, 2002
house mouse	Present	M. Colyer, MEVE, 2002
porcupine	Present	M. Colyer, MEVE, 2002
coyote	Present	USGS observation, 2001
gray wolf	Unconfirmed	Likely occurred historically
kit fox	Present	Armstrong, 1972; McElmo Can.
red fox	Probably Present	
gray fox	Present	Armstrong, 1972; "McElmo"
American black bear	Present	M. Colyer, MEVE, 2002
grizzly bear	Unconfirmed	Likely occurred historically
ringtail	Probably Present	
raccoon	Present	M. Colyer, MEVE, 2002
long-tailed weasel	Present	Armstrong, 1972; Ute Peak
black-footed ferret	Unconfirmed	may have occurred historically
badger	Present	USGS observation, 2001
western spotted skunk	Present	Armstrong, 1972; Moqui
striped skunk	Present	M. Colyer, MEVE, 2002
mountain lion	Present	M. Colyer, MEVE, 2002
bobcat	Present	M. Colyer, MEVE, 2002
wapiti	Unconfirmed	M. Colyer, MEVE, 2002
mule deer	Present	M. Colyer, MEVE, 2002
pronghorn	Present	M. Colyer, MEVE, 2002
bighorn sheep	Unconfirmed	M. Colyer, MEVE, 2002

Unconfirmed = unlikely to occur but retained for present; Probably Present = species likely to occur as range is near or includes park; Present = documented in some fashion.

Table 5a. Level of documentation for major groups of mammals on AZRU and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	Number sp. present		Percent of likely sp.	
			2001	2002	2001	2002
Insectivora	3	1	0	0	0	0
Chiroptera	17	16	7	8	44	50
Lagomorpha	3	2	2	2	100	100
Rodentia	26	23	7	12	30	52
Carnivora	17	14	1	6	7	43
Artiodactyla	3	2	1	1	50	50
Total	69	58	18	27	31%	50%

Table 5b. Level of documentation for major groups of mammals on ELMO and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	Number sp. present		Percent of likely sp.	
			2001	2002	2001	2002
Insectivora	3	1	0	0	0	0
Chiroptera	19	18	0	13	0	72
Lagomorpha	3	3	0	1	0	33
Rodentia	31	17	0	11	0	65
Carnivora	16	12	0	5	0	42
Artiodactyla	4	3	0	0	0	0
Total	76	54	0	30	0%	56%

Table 5c. Level of documentation for major groups of mammals on PETR and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	Number sp. present		Percent of likely sp.	
			2001	2002	2001	2002
Insectivora	3	2	0	0	0	0
Chiroptera	19	16	2	5	13	31
Lagomorpha	3	3	2	2	67	67
Rodentia	30	24	18	20	75	83
Carnivora	16	13	3	5	23	38
Artiodactyla	3	2	0	1	0	50
Total	74	60	25	33	42%	55%

Table 5d. Level of documentation for major groups of mammals on SAPU and overall level of documentation for all mammals.

Order	Number sp. possible	Number sp. likely	Number sp. present		Percent of likely sp.	
			2001	2002	2001	2002
Insectivora	4	1	0	0	0	0
Chiroptera	18	17	7	11	41	65
Lagomorpha	3	3	2	2	67	67
Rodentia	34	23	20	20	87	87
Carnivora	17	14	2	5	14	36
Artiodactyla	5	2	1	1	50	50
Total	81	60	32	39	53%	65%

Table 5e. Level of documentation for major groups of mammals on YUHO and overall level of documentation for all mammals.

YUHO Order	Number sp. possible	Number sp. likely	Number sp. present		Percent of likely sp.	
			2001	2002	2001	2002
Insectivora	4	1	0	0	0	0
Chiroptera	17	15	12	15	80	100
Lagomorpha	3	3	3	3	100	100
Rodentia	23	20	15	15	75	75
Carnivora	16	13	11	11	85	85
Artiodactyla	2	2	2	2	100	100
Total	65	54	43	46	80%	85%

Table 6a. Locations sampled on AZRU during 2002. Number of species documented at a given location is given, with number of animals actually captured or observed given in parentheses.

Location ID	Waypoint name	UTM (NAD27) Easting	Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
AZRUWRuin	AZ001A	232516	4080564	05/20/01	opportunistic	1 (1)	S. Haymond
AZRUDitch	AZ002A	232498	4080827	05/20/02	mist net, acoustic, opportunistic	7 (5)	S. Haymond, E. Valdez
AZRURiver	AZ004A	232866	4080280	05/21/02	mist net, acoustic, opportunistic	6 (1)	S. Haymond, E. Valdez
AZRURiver	AZ004A	232866	4080280	07/19/02	mist net, acoustic, opportunistic		S. Haymond, E. Valdez
LHC AZBench	AZ01B	232759	4081181	05/20/02	track-scat	1	L. Harding
LHC AZBench	AZ02B	767416	4081114	05/20/02	track-scat	1	L. Harding
LHC AZBench	AZ03B	767289	4081052	05/20/02	track-scat	1	L. Harding
LHC AZBench	AZ04B	767312	4080963	05/20/02	track-scat	1	L. Harding
LHC AZBench	AZ05B	767503	4081163	05/20/02	track-scat	1	L. Harding
LHC AZBench	AZ06B	767331	4081134	05/21/02	track-scat	1	L. Harding
LHC AZBench	AZ07B	767267	4080830	05/21/02	track-scat	1	L. Harding
LHC AZBench	AZ08B	767379	4080937	05/21/02	track-scat	1	L. Harding
AZTANRV	AZ09B	232938	4080299	05/21/02	track-scat	1	L. Harding
AZRURiver	RAZ01A	233058	4080461	05/21/02	trapline	1 (1)	S. Haymond, E. Valdez
AZRURiver	RAZ01B	232878	4080292				S. Haymond, E. Valdez
AZTANRV	RAZ10A	232894	4080301	05/21/02	trapline	1	L. Harding
AZTANRV	RAZ10B	233013	4080355				L. Harding
	AZ001C	232648	4080981	10/16/02	opportunistic	1	M. Bogan
	AZ002C	232623	4080890	10/16/02	opportunistic	1 (12)	M. Bogan
	AZ003C	767331	4080983	10/16/02	opportunistic	1	M. Bogan
	AZ004C	232944	4080474	10/16/02	opportunistic	1 (1)	M. Bogan

Table 6a. Continued.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
	AZ005C	232888	4080578	10/16/02	opportunistic	1 (1)	M. Bogan
	AZ006C	232475	4080686	10/16/02	opportunistic	1 (1)	M. Bogan
	AZ007C	232623	4080890	10/16/02	opportunistic	1 (1)	M. Bogan
	AZ008C	767264	4080705	10/16/02	opportunistic	1	M. Bogan
	AZ009C	232547	4080600	10/16/02	opportunistic	1	M. Bogan

Table 6b. Locations sampled on ELMO during 2002. Number of species documented at a given location is given, with number of animals actually captured or observed given in parentheses.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
ELMOPool	EL001A	741698	3880523	7/15/2002	mist net, acoustic	13 (14)	S. Haymond, E. Valdez
ELMOCamp	EL002A	742967	3880229	7/15/2002	opportunistic	2 (2)	S. Haymond
ELMOSewage	EL003A	742245	3879840	7/16/2002	mist net, acoustic	5 (2)	S. Haymond, E. Valdez
ELMOTop	EL004A	741483	3880368	7/17/2002	acoustic	3	E. Valdez
LHC Box	EL01B	741461	3880399	7/16/2002	track-scat	1	L. Harding
LHC Box	EL02B	741481	3880502	7/16/2002	track-scat	1	L. Harding
LHC Box	EL03B	741427	3880489	7/16/2002	track-scat	1	L. Harding
LHC Box	EL04B	741435	3880475	7/16/2002	track-scat	1	L. Harding
LHC Box	EL05B	741384	3880440	7/16/2002	track-scat	1	L. Harding
LHC Box	EL06B	741392	3880366	7/16/2002	track-scat	1	L. Harding
LHC Box	EL07B	740946	3880288	7/16/2002	track-scat	1	L. Harding
LHC NMR	EL08B	741638	3880758	7/17/2002	track-scat	1	L. Harding
LHC NMR	EL09B	741230	3880738	7/17/2002	track-scat	1	L. Harding
LHC Box2	EL10B	740938	3880122	7/17/2002	track-scat	1	L. Harding
LHC Box	EL11B	741506	3880373	7/17/2002	track-scat	1	L. Harding
ELPOL	RELPOLA	741691	3880408	6/13/2002	trapline	2 (10)	M. Bogan, C. Ramotnik
ELPOL	RELPOLB	741665	3880534	6/13/2002			M. Bogan, C. Ramotnik
EL101	REL101A	743130	3880843	6/12/2002	trapline	5 (19)	M. Bogan, C. Ramotnik
EL101	REL101B	743212	3880678	6/12/2002			M. Bogan, C. Ramotnik
EL98	REL98A	743129	3880156	6/11/2002	trapline	2 (3)	M. Bogan, C. Ramotnik
EL98	REL98B	742985	3879943	6/11/2002			M. Bogan, C. Ramotnik

Table 6b. Continued.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
ELIR	RELIRA	741876	3880573	6/13/2002	trapline	3 (17)	M. Bogan, C. Ramotnik
ELIR	RELIRB	741706	3880655	6/13/2002			M. Bogan, C. Ramotnik
ELSIR	RELSIR	741659	3880369	10/17/2002	trapline	3 (8)	M. Bogan, C. Ramotnik
ELVC	RELVC	741918	3880307	10/16/2002	trapline	1 (4)	M. Bogan, C. Ramotnik
RELNI	RELNIA	741298	3880503	10/17/2002	trapline	3 (11)	M. Bogan, C. Ramotnik
RELNI	RELNIB	741344	3880473	10/17/2002			M. Bogan, C. Ramotnik

Table 6c. Locations sampled on PETR during 2002. Number of species documented at a given location is given, with number of animals actually captured or observed given in parentheses.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
PETRRINC	PE001A	341848	3887719	05/22/02	acoustic, opportunistic	3 (1)	S. Haymond, E. Valdez
PETRVC	PE006A	344012	3889874	05/24/02	opportunistic	2 (2)	S. Haymond
Mesa Prieta	PE007A	339716	3886945	05/29/02	acoustic	1	S. Haymond, E. Valdez
Marcada	PE008A	346373	3895102	06/10/02	acoustic	2	S. Haymond, E. Valdez
VC	PE010A	344175	3889551	06/11/02	acoustic	1	S. Haymond, E. Valdez
Lava Shadows	RPE04A	344144	3889477	06/11/02	trapline	3 (5)	S. Haymond, E. Valdez
Lava Shadows	RPE04B	343856	3889517	06/11/02			S. Haymond, E. Valdez
Boca Negra	PE012A	343191	3892352	06/12/02	acoustic	2	S. Haymond, E. Valdez
LHC PEMEPR	PE01B	339529	3886924	05/23/02	track-scat	1	L. Harding
LHC PEMEPR	PE02B	339545	3886764	05/23/02	track-scat	1	L. Harding
LHC PEMEPR	PE03B	339506	3886691	05/23/02	track-scat	1	L. Harding
LHC PEMEPR	PE04B	339293	3886177	05/23/02	track-scat	2	L. Harding
LHC PEMEPR	PE05B	339491	3885878	05/23/02	track-scat	1 (1)	L. Harding
LHC PERIN	PE06B	342643	3888685	05/24/02	track-scat	1	L. Harding
LHC PERIN	PE07B	340586	3888488	05/24/02	track-scat	1 (1)	L. Harding
RINCMESA	RPE01A	342741	3888468	05/23/02	trapline	3 (9)	S. Haymond, E. Valdez
RINCMESA	RPE01B	342699	3888732	05/23/02			S. Haymond, E. Valdez
SCONE	RPE02A	338220	3887745	05/24/02	trapline	3 (5)	S. Haymond, E. Valdez
SCONE	RPE02B	338764	3888068	05/24/02			S. Haymond, E. Valdez
VC	RPE03A	344243	3889680	06/11/02	trapline	3 (5)	S. Haymond
VC	RPE03B	344156	3889591	06/11/02			S. Haymond

Table 6c. Continued.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
Lava Shadows	RPE04A	344144	3889477	06/11/02	trapline	3 (5)	E. Valdez
Lava Shadows	RPE04B	343856	3889517	06/11/02			E. Valdez
LHC PERIN2	RPE08A	340836	3888285	05/24/02	trapline	4 (7)	L. Harding
LHC PERIN2	RPE08B	340704	3888474	05/24/02			L. Harding

Table 6d. Locations sampled on SAPU during 2002. Number of species documented at a given location is given, with number of animals actually captured or observed given in parentheses.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
RABO1	RABO1A	373850	3812747	06/18/02	trapline	5 (15)	M. Bogan, C. Ramotnik
RABO1	RABO1B	373727	3812589	06/18/02			M. Bogan, C. Ramotnik
RABO2	RABO2A	373854	3813113	06/19/02	trapline	3 (12)	M. Bogan
RABO2	RABO2B	373529	3813031	06/19/02			M. Bogan
RABO3	RABO3A	373900	3813057	06/19/02	trapline	5 (24)	C. Ramotnik
RABO3	RABO3B	374064	3812912	06/19/02			C. Ramotnik
RABO4	RABO4A	373653	3812052	06/19/02	trapline	2 (5)	M. Bogan, C. Ramotnik
RABO4	RABO4B	373687	3812119	06/19/02			M. Bogan, C. Ramotnik
RABO5	RABO5A	373516	3812460	06/20/02	trapline	2 (5)	M. Bogan, C. Ramotnik
RABO5	RABO5B	373275	3812314	06/20/02			M. Bogan, C. Ramotnik
RABO6	RABO6A	373771	3812804	06/21/02	trapline	5 (6)	M. Bogan, C. Ramotnik
RABO6	RABO6B	373744	3813015	06/21/02			M. Bogan, C. Ramotnik
RABO7	RABO7A	373539	3812206	06/21/02	trapline	3 (7)	M. Bogan, C. Ramotnik
RABO7	RABO7B	373346	3812272	06/21/02			M. Bogan, C. Ramotnik
GRNQ	SA001A	399289	3791249	05/25/02	acoustic	0	S. Haymond
Abo	SA002A	373472	3812389	05/26/02	acoustic, opportunistic	2 (8)	S. Haymond
GRNQ	SA003A	398592	3791728	05/26/02	opportunistic	3 (9)	S. Haymond
Abo	SA004A	373482	3812386	05/27/02	mist net, acoustic	6 (21)	P. Cryan, S. Haymond, E. Valdez
Abo	SA004A	373472	3812389	08/22/02	mist net, acoustic		P. Cryan, E. Valdez
Quarai	SA005A	381290	3828681	05/28/02	mist net, acoustic	9 (3)	S. Haymond, E. Valdez

Table 6d. Continued.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
LHC SAGQ	SA01B	399825	3791567	05/25/02	track-scat	1	L. Harding
LHC SAGQ	SA02B	399136	3791621	05/25/02	track-scat	1	L. Harding
LHC SAGQ	SA03B	398739	3791461	05/25/02	track-scat	1	L. Harding
LHC ABO	SA04B	373400	3812322	05/26/02	track-scat	1 (1)	L. Harding
LHC ABO	SA05B	373391	3812323	05/26/02	track-scat	1	L. Harding
LHC ABO	SA06B	373189	3812264	05/26/02	track-scat	1	L. Harding
LCH QUAR	SA07B	381572	3828727	05/27/02	track-scat	1	L. Harding
LCH QUAR	SA08B	381573	3828650	05/27/02	track-scat	1	L. Harding
LCH QUAR	SA09B	381558	3828587	05/27/02	track-scat	1	L. Harding
LCH QUAR	SA10B	381436	3828380	05/27/02	track-scat	1	L. Harding
LCH QUAR	SA11B	381310	3828365	05/27/02	track-scat	1	L. Harding
LCH QUAR2	SA12B	381457	3828854	05/28/02	track-scat	1	L. Harding
LCH QUAR2	SA13B	381368	3828797	05/28/02	track-scat	1	L. Harding
LCH QUAR2	SA14B	381128	3828885	05/28/02	track-scat	1	L. Harding
LCH QUAR2	SA15B	381046	3828898	05/28/02	track-scat	1	L. Harding

Table 6e. Locations sampled on YUHO during 2002. Number of species documented at a given location is given, with number of animals actually captured or observed given in parentheses.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
Ismay	YU001A	705139	4124987	06/03/02	mist net, acoustic, opportunistic	11 (4)	S. Haymond, E. Valdez
Ismay	YU002A	705497	4126207	06/04/02	mist net, acoustic	5 (2)	S. Haymond, E. Valdez
Ismay	YU003A	704889	4125229	06/05/02	acoustic	6	S. Haymond, E. Valdez
LHC YHI	YU01B	705228	4124877	07/03/02	track-scat	1	L. Harding
LHC YHI	YU02B	705212	4124881	07/03/02	track-scat	1	L. Harding
LHC YHI	YU03B	705163	4124849	07/03/02	track-scat	1	L. Harding
LHC YHI	YU04B	705135	4124959	07/03/02	track-scat	2	L. Harding
LHC YHI	YU05B	705149	4124804	07/03/02	track-scat	1	L. Harding
LHC YHI	YU06B	705516	4126211	07/03/02	track-scat	2	L. Harding
LHC YHI	YU07B	705504	4126196	07/03/02	track-scat	1	L. Harding
LHC YHI	YU08B	704962	4125367	07/03/02	track-scat	1	L. Harding
RYU10	RYU10A	704997	4125083	09/19/02	trapline	2 (4)	M. Bogan
RYU10	RYU10B	705157	4124959	09/19/02			M. Bogan
YU15C	YU15C	705367	4125006	09/21/02	trapline	2 (4)	M. Bogan
RYU11	RYU11A	705034	4124781	09/19/02	trapline	1 (1)	M. Bogan
RYU11	RYU11B	704950	4124584	09/19/02			M. Bogan
RYU12	RYU12A	705330	4125038	09/20/02	trapline	1 (4)	M. Bogan
RYU12	RYU12B	705402	4124891	09/20/02			M. Bogan
RYU13	RYU13A	705946	4124975	09/20/02	trapline	1 (1)	M. Bogan
RYU13	RYU13B	705976	4124832	09/20/02			M. Bogan
RYU14	RYU14A	705269	4124996	09/21/02	trapline	1 (1)	M. Bogan

Table 6e. Continued.

Location ID	Waypoint name	UTM (NAD27) Easting	UTM (NAD27) Northing	Date of visit	Sampling method	No. of species (animals)	Observer(s)
RYU14	RYU14B	705326	4124865	09/21/02			M. Bogan